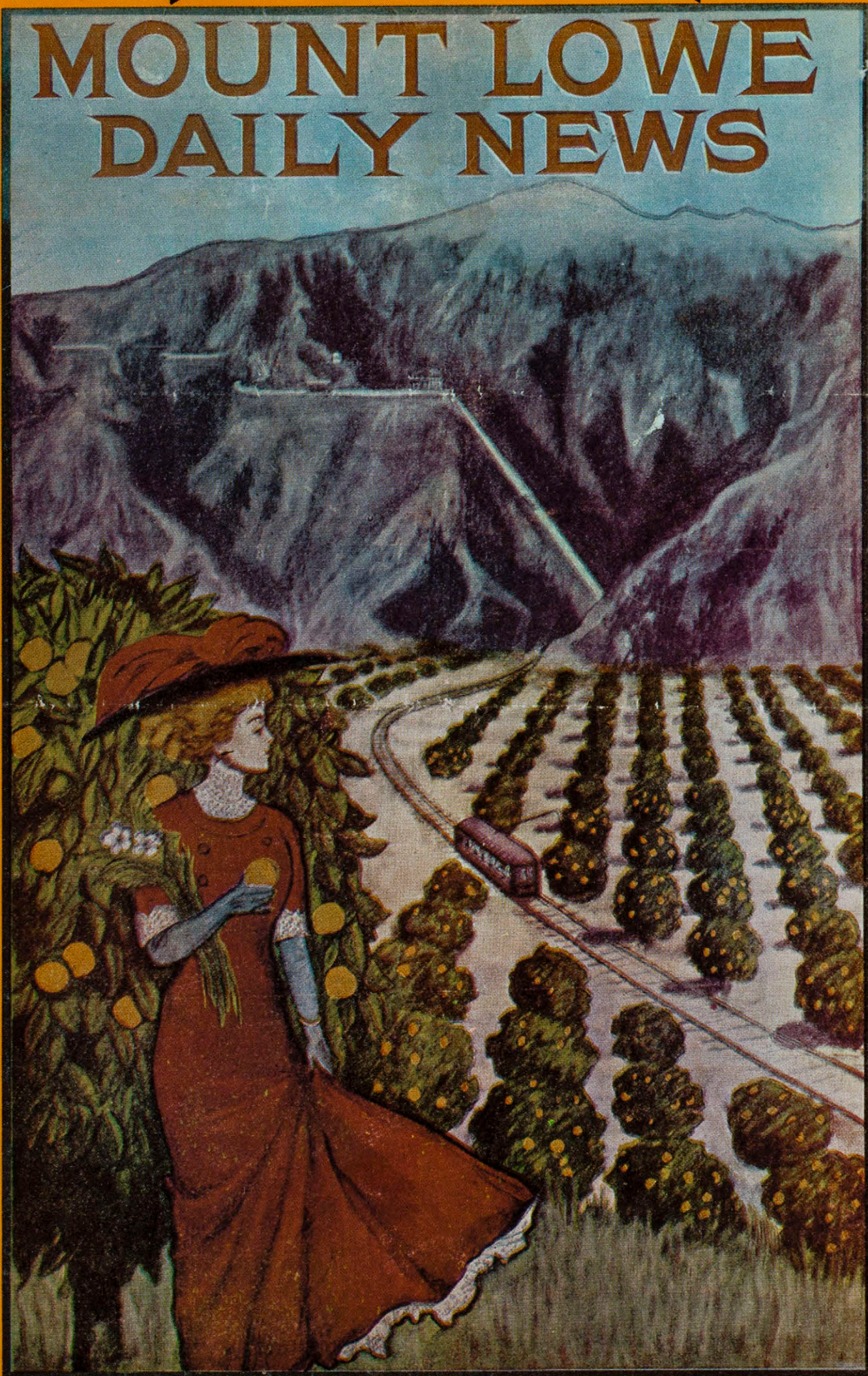


THE QUARTERLY MAGAZINE OF THE NATURAL
HISTORY MUSEUM OF LOS ANGELES COUNTY
VOL. 9/NO. 4 SPRING 1971

Terra

MOUNT LOWE DAILY NEWS



Alliance Chairman's Report to Members (Condensed)

This has been a year of change. We introduced our new director Dr. Giles Mead to you a year ago. He came into office at a time when the economic environment in Southern California was not the healthiest for organizations such as ours. For example, many museum members were from the aerospace industry, and we saw the attrition of their memberships as curtailment of that industry grew. We felt, therefore, that our initial efforts should be toward broadening our membership base. Toward this end, we took the following steps.

Following the lead of the Museum itself, we changed our name to say what we are, the Natural History Museum Alliance, much simpler and more realistic than the old Museum Alliance of the Los Angeles County Museum of Natural History.

Secondly, we felt that the environmental issue is most closely associated with this Museum. To emphasize this and toward the effort of making our magazine a greater tool of generating membership, we have named the Quarterly magazine *Terra*, to tie it closer to the environment and give it more popular appeal.

We created a brochure to better present the scope of the Museum and Alliance activities in the solicitation of new members. And we have started a campaign of broader mail solicitation of new members, using our attractive new mailing piece. The first 5000 are in the mails.

Alliance Programs, Receptions and Tours have continued to be well received and attended. For example, some 1417 attended our Open House at the Museum, a figure that exceeds 25% of our membership.

During the year through the establishment of a Hancock Park Committee, we have increased our support and activity at the La Brea Dig.

Our objective is at all times to help and foster the continued growth of this great Museum. It is one of the finest Natural History Museums in the country. To keep it such and to make it greater,

more and more private contributions are needed. Our membership *must* grow so that we may continue to serve this community in a better way. It is a good place to be involved. You can take pride in having supported this fine institution. And each of you can help enormously by securing at least one new member this year.

William W. Drewry, Jr.

Travel Anyone?

There is no waiting list for the Museum Alliance-World Airways Charter departing Los Angeles on September 18 and returning October 16. The fare is \$275 round trip and your chances are rated good to make it. Call Mrs. Fran Kellough, 749-3583 for reservations.

ABOUT THE AUTHORS: **John Dewar** is Associate Curator of Western-American Art, Natural History Museum of Los Angeles County. He has written numerous articles for this and other publications.

Dr. William A. Emboden is Research Associate in Botany, Natural History Museum of Los Angeles County and Professor of Biology, San Fernando Valley State College. The Macmillan Company will publish soon his book on Narcotic Plants, expanded from material he wrote for this magazine.

Dr. Peter Furst has departed from Los Angeles to become Department Chairman and Professor of Anthropology at State University of New York, Albany. He has been Associate Director of the Latin American Center at UCLA and will continue as Research Associate of The Natural History Museum of Los Angeles County. His book, *The Ritual Use of Hallucinogens*, is forthcoming from Praeger.

Dixie P. Myers is Museum Education Specialist in Communication at the Natural History Museum of Los Angeles County. She has produced and directed three television dramas and has contributed previously to this and other magazines.

James Zordich is Assistant Curator of Industrial Technology at the Natural History Museum of Los Angeles County. Prior contributions to this magazine include *The First Car into Yosemite*.



The Quarterly magazine of
THE NATURAL
HISTORY MUSEUM
of Los Angeles County
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The cover is a copy of a 1909 issue of the Mt. Lowe News, which began publication in 1895, with George Wharton James as publisher. Originally called the Mt. Lowe Echo, it derived its original name from Echo Mountain.

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Canyon Mountain

The newest and most popular of all the resorts of Southern California are those opened up by the

MOUNT LOWE RAILWAY

Take the Los Angeles Terminal Cars at First Street, or Downey Avenue, Los Angeles; or California Street or Colorado Street, Pasadena. A short ride through Pasadena's beautiful Orange Groves and Rose Gardens, lands the passenger at

ALTADENA JUNCTION

Here take the Electric Cars of the Mount Lowe Railway which winds in and out through the most romantic Canyon in America penetrated by an electric road to

RUBIO AMPHITHEATER

Where a large Music Hall stands on a platform sixty feet above the bed of the Canyon. Connected therewith is an immense dining room 100 x 40 feet, and over sixty sleeping rooms for the accommodation of guests. Rates: \$1.00 to \$2.00 per day. Meals a la Carte.

RUBIO CANYON, The Grand Chasm and Tha-le-ha-ha Falls.

Are reached by a well constructed plank walk, in a few minutes from the Music Hall. Beating crags, towering mountains, ferny dells, mossy grottoes, bubbling springs, foaming cascades, dashing waterfalls, limpid pools in wonderful combinations.

Fairy

Land

Illuminated

Every Saturday and Wednesday night this canyon is beautifully illuminated with thousands of Japanese lanterns and brilliant electric lights and it then becomes a veritable fairy land.

THE GREAT CABLE INCLINE

Starts from Rubio Amphitheater. An unequalled ride to the summit of Echo Mountain, 3500 feet above sea level. This incline is the most wonderful Mountain Railway in the world. It is 3000 feet long and makes a direct ascent of 1400 feet. Smoothly, easily, noiselessly and without smoke or ashes from puffing engine, the ascent is made, and a panorama of sublimity, majesty and beauty, that has not its peer in the wide world, gradually unrolls before the eye. Foothills, Valleys, Gardens, Orchards, Orange Groves, Cities, Ocean Beach, Surf, Ocean, Islands and Snow Clad Mountain Peaks in one view. For further particulars, Time Card, etc. enquire

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Southern California's Magic Mountain Mt. Lowe

by James Zordich

Assistant Curator

Industrial Technology

Thaddeus S. C. Lowe had already achieved fame and fortune as an inventor when, seduced by mild climate and natural wonders, he decided in 1888, at the age of 56, to make Pasadena, California his home.

Professor Lowe (as he was called) achieved his ultimate fame, however, when he completed the Mt. Lowe Railway, situated in the San Gabriel Mountains directly behind Pasadena.

The idea of constructing a railroad in the San Gabriel Mountains had been contemplated long before Lowe became a Pasadena resident. The thoughts concerning the mountain railroad remained somewhat dormant, but were revived after great difficulty had been encountered while placing a telescope on the summit of Mt. Wilson in April, 1889. It was not until 1890 that a survey was made for a railroad. D. J. Macpherson, a brilliant young engineer, had long been interested in the concept of a mountain railroad. It was through

An extensive advertising campaign was launched shortly after the official opening of the Mt. Lowe railroad. This detailed poster, describing the wonders to be seen, is typical of the advertisements which appeared from 1893-1896.

One of the primary attractions on the Alpine Division was the circular bridge. Often the trolley cars would stop on the bridge to offer the passengers the opportunity to enjoy the view of the valley, and to occasionally take a photograph. Echo Mountain and the track leading to the Alpine Tavern are visible in the background. The white dome of the observatory is barely visible.



his own efforts that he raised the capital to finance a preliminary survey, conduct the survey, and then endeavor to solicit the support of backers to finance the construction of the mountain railroad.

With the survey of a proposed route in his hands, D. J. Macpherson endeavored to find interested backers, but with little success. It was not until Professor Lowe became acquainted with the proposal for the railroad that the future began to look favorable. Professor Lowe agreed to finance the project which began immediately with a final survey. Shortly thereafter, on June 2, 1891, the Pasadena and Mt. Wilson Railway Company was incorporated. The company had a railroad on paper but, in fact, did not have a right-of-way after failing to gain any concessions from the owners of the property leading to Mt. Wilson. Professor Lowe's interest in a mountain railroad had become so intense that rather than meet with failure, a new route was chosen, but not to Mt. Wilson; Echo Mountain was the new objective. It was Echo Mountain's unique setting which would lend itself as a hotel site, as well as its closeness to a portion of the original route surveyed for the railroad to Mt. Wilson that resulted in its choice for the new route.

The new route to Echo Mountain required new surveys, as well as a complete change in the type of rolling stock to be used on the route. The first section of the railroad from Altadena (later known as Mountain Junction) to Rubio Canyon, part of the original right-of-way for the proposed Mt. Wilson Railway, was to be a standard electric trolley car route. The section from Rubio Canyon to Echo Mountain, which was to be an incline cable route, required equipment specially designed for the purpose. The land upon which the route from Rubio Canyon and beyond was built was United States Government property. On December 20, 1892, by joint vote of the United States Senate and the House of Representatives, an act was signed which granted to the Pasadena and Mt. Wilson Railway Company the right-of-way and certain lands for railroad purposes through the San Gabriel Forest Reserve (now known as Angeles National Forest).

In December, 1891, Professor Lowe drove the first stake which marked the beginning of construction of the Mt. Lowe Railroad. Professor Lowe's own statement best describes the difficulty of the work encountered during the first year:

The first year was a continual outlay for surveys and bridle roads necessary to reach the work to be accomplished and to furnish supplies; the difficult grading and roadbed building along the perilous canyons and mountain sides; the building of the numerous bridges and the heavy work of spanning the canyon at the foot of the Incline with heavy timbered structures; the opening up of Rubio Canyon to popularize the resort at the opening of the road; the slow tedious work of conveying supplies by pack animals; the hauling in by horse of heavy construction material and machinery to the foot of the Incline; the construction of the Incline after grading... all of these were new and difficult problems, a constant challenge, necessitating Herculean strength to overcome.

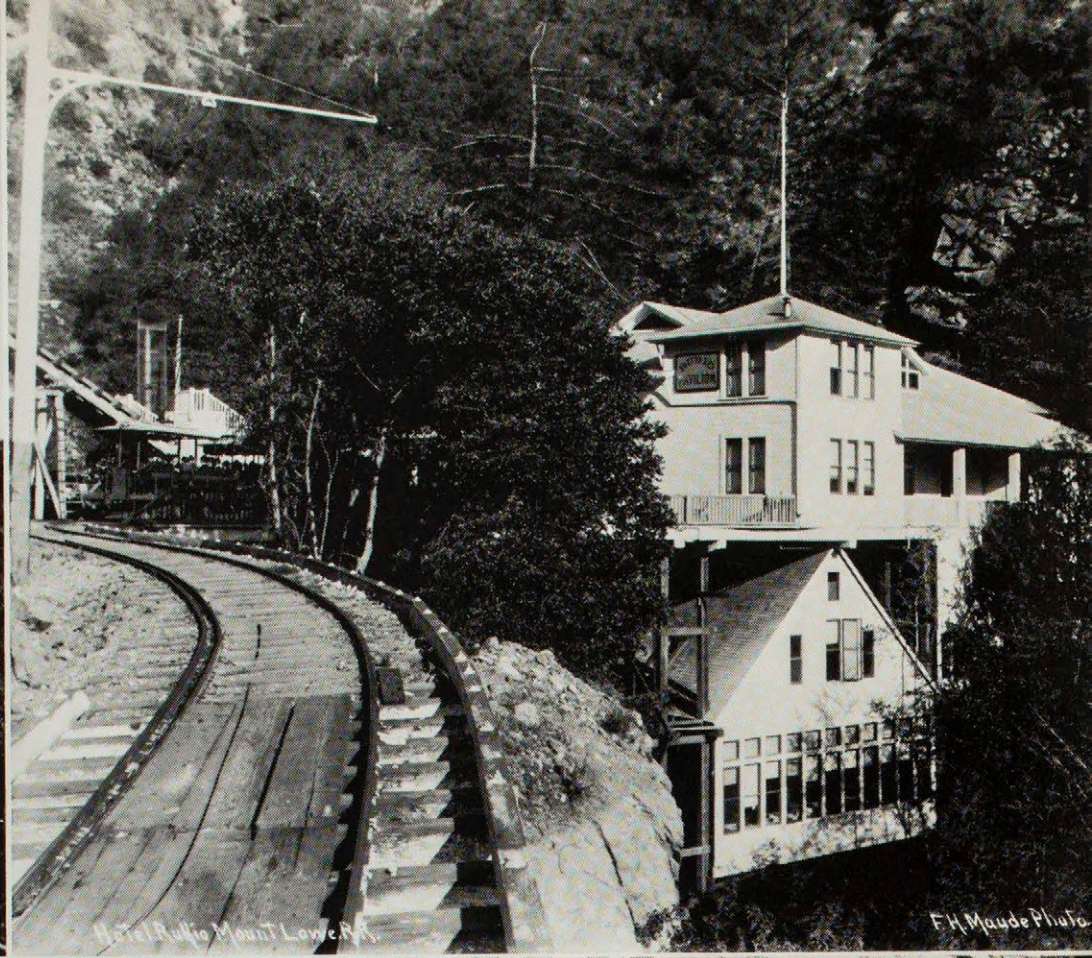
The work was not easy, oftentimes requiring blasting in order to remove rock from the right-of-way. Burros were used for carrying supplies up the mountain. Supplies such as water and cement were packed in for building walls and buttresses before track could be laid. Work on the Incline was underway by April 13, 1892, more than two years after the preliminary surveys for the railroad had been made. Owing to the difficult terrain, most of the grading and filling necessary for the Incline was done by hand. It was not until the grading had been completed that a temporary roller and cable system could be installed to transport supplies from Rubio Canyon to the top of Echo Mountain. Before track could be laid for the Incline a 40-foot chasm had to be bridged. Macpherson again proved his versatility as an engineer when he designed the bridge to cross the gap. The span was 200 feet long on a 62 per cent grade which meant that the upper portion of the bridge was 114 feet higher than the bottom. The mechanism which operated the Incline was the invention of Andrew Smith Hallidie, who had previously engineered some of the

steep cable railways over the hills of San Francisco. The Incline was a total of 3,000 feet in length and represented a grade varying from 48 per cent to 62 per cent traversed by a cable measuring one and one-half inches thick and weighing six tons.

During construction of the right-of-way from Mountain Junction (Altadena) to Rubio Canyon, and the Incline from Rubio Canyon to Echo Mountain, construction was also under way on three hostleries: Rubio Pavilion in Rubio Canyon; the Chalet and Echo Mountain House on Echo Mountain. The Rubio Pavilion was built between the walls of Rubio Canyon at an elevation of 2,200 feet and served as the debarkation point for people boarding the Incline cars, as well as offering complete hotel and dining facilities. The Chalet was a smaller hotel built on Echo Mountain as a temporary hostelry until the Echo Mountain House was completed. Much of the material used in the construction of the Chalet was hauled in by burro and wagons and as a consequence construction was extremely slow. By March, 1893, the foundations had been laid for the Echo Mountain House, but it was not until August 4, 1894 that it was completed and open to the public.

By January 29, 1893, all bridging had been completed on the Incline and the laying of the track begun. On May 13, 1893, the first regular railway equipment began operation on the Mountain Junction to Rubio Canyon section of the route. By now most of the construction had been completed and, on June 21, 1893, the Incline cable was set in operation for the first time using electricity for power. Electric power to operate the Incline was supplied by the power station located at Mountain Junction and also by generators driven by water wheels which were located beneath the Rubio Pavilion. After the Rubio generating plant was placed in operation, the Mountain Junction plant was used for supplying power to the Altadena-Rubio section of the railroad and for supplementing the Rubio-Echo Mountain facilities during dry periods.

With a great celebration, the Mt. Lowe Railroad was officially opened on July 4, 1893 and immediately became a popular tourist attraction. Each

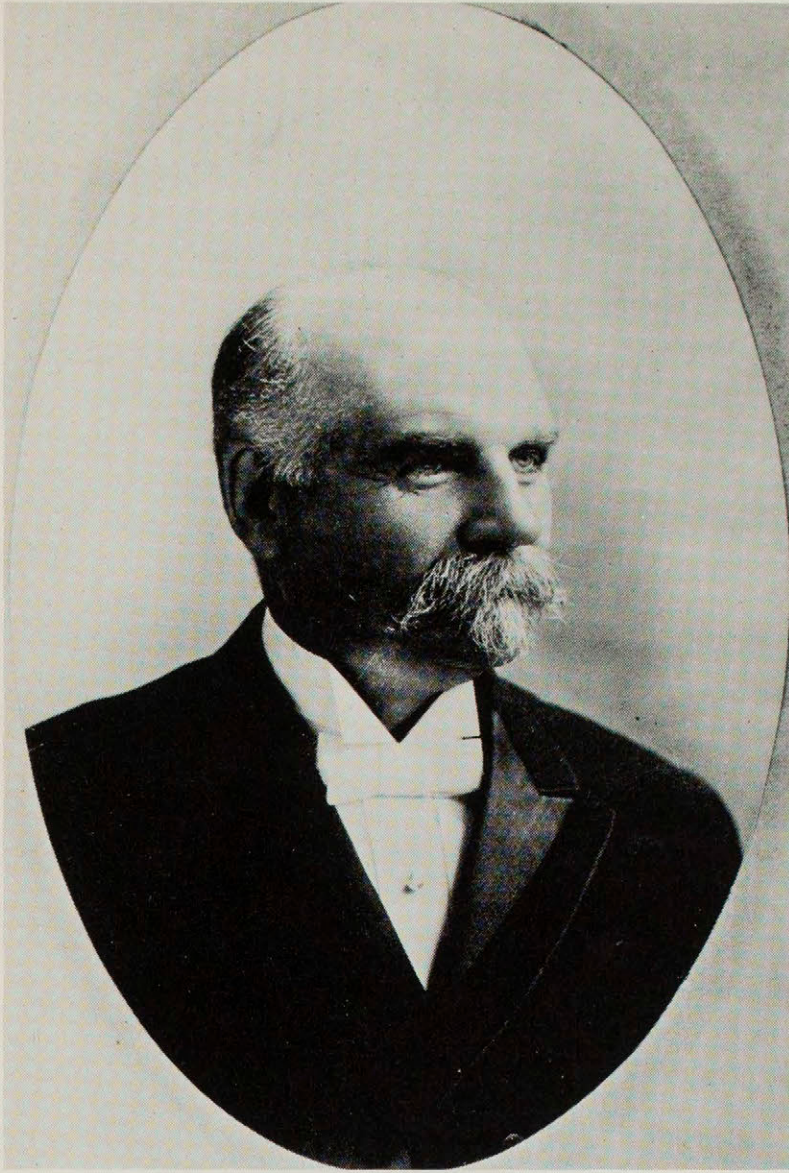


From Rubio Canyon, it was a short ride to the top of Echo Mountain. There, visitors could remain at the Echo Mountain House or continue on to Crystal Springs. Two cars were used on the Incline, both of which passed each other at the middle of the Incline. An interesting feature on early Incline cars was the polished brass umbrella holders which were attached to the sides of each car.

Half way between Echo Mountain and Crystal Springs was Granite Gate. At this location dynamite was required to remove tons of granite in order to create a right-of-way. The job was costly and time consuming but essential for the completion of the Alpine route. Granite Gate still exists today, virtually unchanged.

The Rubio Pavilion was the end of the line from Altadena. It was from here that visitors boarded the Incline for the trip to Echo Mountain and beyond. The Pavilion offered many services including hotel rooms and a dining facility which was located on the lower level. Located behind the Pavilion were wooden walks and stairs that led to the many waterfalls located in Rubio Canyon.

The Alpine Tavern was the last hostelry to be built and the last to be destroyed. Located deep in the mountains the railroad was the only means of supply. This scene was photographed in 1896, shortly after the Tavern was opened to the public. During the ensuing years, the Tavern was enlarged many times and cottages built along the adjacent slopes to accommodate the large number of overnight visitors.



Professor Thaddeus S. C. Lowe, is shown in a photograph which was taken while the Mt. Lowe railroad was still under construction.

On July 4, 1893, the Mt. Lowe railroad was opened to the public. Visitors on opening day were transported in open trolley cars which formerly served as work cars during the construction of the railroad. (Photo, courtesy of Southern Pacific Railroad).



day patronage grew and the hotels and dining facilities prospered. The overflow of hotel guests from the Rubio Pavilion was housed at the Chalet atop Echo Mountain. The future of the Mt. Lowe Railroad looked prosperous. On November 10, 1893, the Echo Mountain Post Office was authorized. On Monday, March 12, 1894, the first issue of the *Mt. Lowe Echo*, edited by George Wharton James, was published in the printing plant located in the Rubio Pavilion. The year 1894, in addition, saw the Echo Mountain House open, as well as the opening of the observatory, supervised by Dr. Lewis Swift, installation of the 3,000,000 candle power Chicago World's Fair searchlight, and construction of the menagerie.

Professor Lowe had been successful in making the dream of the San Gabriel Mountain railroad a reality, but he was not satisfied. After a discussion with D. J. Macpherson, the decision was made to extend the Mt. Lowe Railroad to Crystal Springs where a third hotel would be constructed. Up to the time the decision was made to extend the railroad, Professor Lowe had been able to personally finance the construction. With revenue not substantial enough to finance the new extension, 7 per cent bonds were issued. Unique, also, in the search for construction finances was the founding of the Alpine Club. Membership in the club was limited to 100 members who paid \$1,000 each which represented 10 shares of capital stock in the Mt. Lowe Railway company. It was hoped that \$100,000 could be raised by this means which would be used in financing the construction of the new extension known as the Alpine Division.

From an engineering standpoint the Alpine Division was a greater construction challenge. The right-of-way was literally blasted from the side of the mountains. Substantial bridging was necessary in many locations. Eighteen trestles were required on the route which consisted of 127 curves and ascended in elevation from 3,500 feet at Echo Mountain to 5,000 feet at Crystal Springs. Probably the most outstanding engineering achievement on the Alpine Division was the circular bridge — again engineered by Macpherson. On September 25, 1894, the

Los Angeles *Times* reported that a contract had been signed with the California Construction Company for construction of the Alpine Division. By August, 1895 the Alpine Division was near completion, while construction on the Alpine Club at Crystal Springs was just beginning. On November 3, 1895, the Alpine Club had been completed; but, by that time, the name had been changed to Alpine Tavern.

While construction was still in progress on the Alpine Division, Professor Lowe led a party of visitors to the summit of Oak Mountain, where he told those gathered about his plans to construct a fourth hostelry on the summit. At that time the name of Oak Mountain came under discussion and, as a result, it was unanimously decided by those present that Mt. Lowe would be a more fitting name. The incident was reported in the newspapers and came to the attention of Andrew McNally, of the map-making firm of Rand McNally & Co., who offered to officially note the name of Mt. Lowe on all maps produced by that company.

With the construction of the Alpine Division and the Alpine Tavern completed, it was then possible to travel via electric trolley from the shores of the Pacific Ocean to one of the highest peaks in the San Gabriel Mountains. Advertising for the railroad was quite extensive. Unfortunately, the financial depression of 1896 had the effect of retarding tourist traffic to attractions such as Mt. Lowe. Reduced patronage meant decreased revenue, and by July 1, 1896 the company was unable to pay the interest due on its general obligation bonds. Also, a debt of \$38,000 was held by creditors of the company. The story was clear — the Mt. Lowe Railroad did not have enough money to pay either the interest on its bonds or the debt held by its creditors. Creditors by a majority vote formed a creditors committee which elected a new Board of Directors; however, Professor Lowe was retained as President of the company.

In December, 1897, a new company was organized under the title of the Mt. Lowe Railway Company. The new company purchased all the property and assumed the liabilities of the old Pasadena & Mt. Wilson Railway Com-

pany. Stock held in the old company was exchanged for stock of the new organization. From this point detail about the financial affairs of the company are sketchy. Apparently sometime in 1899, the railroad was sold under court order to Arthur L. Hawes for \$190,000. Again in 1900 the railroad was resold, this time to Valentine Peyton for \$175,000 (less than half of the original cost of construction). Mystery shrouds the activities of the railroad while under the control of Mr. Peyton. In 1902, the railroad was again sold to the newly incorporated Pacific Electric Railway Company headed by Henry E. Huntington. Under Pacific Electric direction, the Mt. Lowe Railroad saw great improvement, not only physically but from a service standpoint, as well. The most marked improvement was made in 1903 when the track on the Altadena-Rubio Canyon section of the route was regauged permitting standard Pacific Electric cars to travel directly into Rubio Canyon. By 1898, Professor Lowe had lost control of his mountain railway. His personal fortune had been expended on the construction of the road. In the end he sacrificed the last of his resources to save his company, but failed. Although the operation of the railway was probably more efficient, the spirit had changed. Those with a superstitious nature might feel that the catastrophic events that followed years later were not without special significance. Perhaps, the absence of Professor Lowe had its effect. In any event, many major disasters occurred in the years following.

On February 5, 1900, in the hours before daybreak, the Echo Mountain House caught fire and was razed to the foundation. Disaster again struck on December 9, 1905 when a wind storm struck Echo Mountain completely destroying the Chalet. During the height of the storm, the roof of the Chalet was blown off and landed upon the power house at the top of the Incline. A fire soon erupted which consumed the power house as well as many other buildings, and for a while threatened the observatory. The cable on the Incline was burned through and went sliding down the Incline. Although the observatory survived unscathed, it met its end during another windstorm on

February 9, 1928.

Up to this time not a single life had been lost during the disasters which plagued the Mt. Lowe Railroad. On February 12, 1909, the Rubio Pavilion was totally destroyed when, during a tremendous rain storm, a slide of rocks and mud descended upon the Pavilion and swept it down Rubio Canyon. The infant son of Fred T. Drew, manager of the Pavilion, was lost during the flood. The Pavilion was never rebuilt but was replaced with an unloading platform used by passengers for boarding the Incline cars. The Mt. Lowe Railroad was to run for twenty-seven years until its next major disaster which came at 2:00 a.m. on September 15, 1936 when the Alpine Tavern was totally consumed by a fire which originated in the kitchen. With the loss of the Tavern the prime attraction to tourists, who patronized the railroad, was gone. The building had been covered by insurance, but whether the Pacific Electric Company planned to rebuild the hostelry is not clear.

Shortly after the fire, service on the railroad was suspended. Evidently, there had never been any plans for rebuilding the Tavern and reopening the railroad. On November 12, 1937 the Pacific Electric Railway Company filed an application with the Public Utilities Commission for the abandonment of the Mt. Lowe Railroad. On March 14, 1938 permission was granted by the Public Utilities Commission for the abandonment of Mt. Lowe (twelve days after a heavy rain storm washed away major portions of the right-of-way).

Abandonment followed soon after the decision of the Public Utilities Commission had been rendered. By September 9, 1941 all abandonment activities had been completed. The final curtain was closed on December 23, 1942 when the Los Angeles County Flood District removed the remaining platform and trestles from Rubio Canyon. As specified in the government Act of 1892, the right-of-way and other railroad land north of Rubio Canyon reverted back to the U.S. Government. All that remains today are the foundations, the rock walls built to support the right-of-way, and the mountain named in honor of Professor Thaddeus S. C. Lowe.

Orchids in Witchcraft and Medicine

by William A. Emboden Jr.

Lan was the word Confucius used to denote the fragrance of orchids, and he compared this with the company of good men. This mention of orchids, approximately 500 years B.C., is among the earliest records of the plant apart from illustrations. These were doubtless terrestrial forms such as the *Cymbidium*, known to the Chinese as *lan hua* and another as *kim-ling-pin*. In Japanese the word *lan* metamorphosed into *ran* and evidence suggests that both words stood for fragrance, beauty, nobility, elegance and generally for things of a feminine grace and refinement. Symbolically to the Chinese the orchid was also emblematic of the virtue of a lonely scholar. This may be attributed to *Confucius* also, for he is said to have found the *lan* growing among common flowers in a wild valley; a reference to himself as a scholar among the less intelligent and worldly princes of his time.

Scholars who attempt to trace the word *lan* to the writings of the Emperor Shen-Nung dated 2737 B.C. must realize that the figure of this Emperor is probably legendary and that *Pen Ts'ao* in which this reference appears was not seen in written form until the first century A.D. during the Han Dynasty. This Classic Herbal, as it has been called, could not have appeared at the earlier date for there was no written language in China at this time. It does, however, reappear in the *Book of Odes*, the *Book of Rites*, the writings of Huang-ti, and Tso-chuan. Later *lan* was used in a broad generic sense to include all kinds of fragrant flowers.

The *Pen Ts'ao kang mu* compiled between the years 1552 to 1587 by the physician Li Shi Chen relied heavily upon writings by Ch'en Jen Yu which dealt with *Cymbidiums* and a limited number of other genera. During the Sung Dynasty (960-1279) Wang Kui Lio wrote the *Lan Pu* and this was succeeded by the *Lan Yen* by Mao Siang. In all of these volumes the plant and its products are associated with virtue and the restoration of virtue. What a different tradition from that of the Western World!

The genus *Dendrobium* has figured prominently in Chinese medicine, and recently a Harvard scholar, Shui-Ying Hu, has translated a *Chinese Materia*

Medica (Peking, 1960) concerning the medicinal uses of this genus. The Chinese name for *Dendrobium* is *Shih-hu*, meaning "living rock" referring to the habitat of the genus; this, of course, was interpreted to mean that any medicine extracted from one of these plants would make a man strong and able to withstand the vicissitudes of life. Thus, the stem of *Dendrobium* species ground into a powder became a staple Chinese drug at an early date, and represents one of the orchids of the *Pen Ts'ao*. A recent *Chinese Materia Medica* issued in Peking (1960) devotes 16 pages to the uses of *Dendrobiums* in Chinese medical practice. Investigating these claims, the Japanese and American pharmacologists have been finding promising antibacterial and antitumor activity from some of this material. All parts of the plant are sold under the name *Hsien-hu*; a further breakdown into fresh and dry lots and species has resulted in five marketing categories. In most instances the plants are dried upon being collected. When dried stems are sold, they are revitalized at the time of use by soaking the pieces of stem and cutting them into sections. *Dendrobium linawianum* contains three alkaloids, one of which has been identified and named dendrobine.

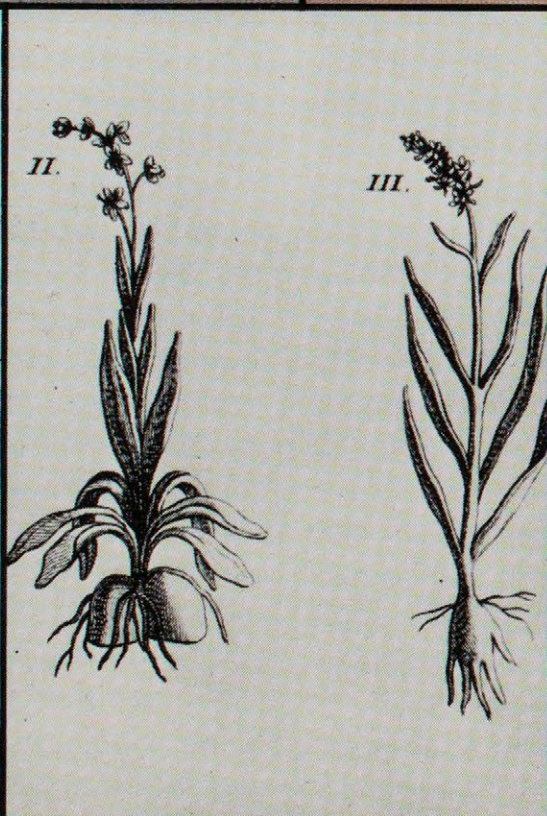
For those involved in the *Yin-Yang* concepts of diet and medicine, the *Dendrobium* medicinals all belong to the Yin category of rather plain, slightly sweet, salty, and cooling herbs. These orchid drugs are said to strengthen the stomach, promote salivation and increase one's appetite. In cases of fever, thirst, debilitation and excessive perspiration, the dendrobial drugs are prescribed.

The oldest Greek myth associated with the origin of the orchid has a great deal to do with its subsequent use in witchcraft and medicine. *Orchis* is the Greek word for testicle, an allusion derived from the testicle-like form of the roots of some of the terrestrial species as well as the cryptic nature of the seeds (proembryos). It was thought that orchids arose where the semen from certain copulating animals or satyrs had dropped to the ground. *Orchis* was also the name of the son produced by the questionable relationship between a nymph and a satyr. Being given to his



Left *Bletia hyacinthina*,
"lan" of Emperor Shen-
Nung (2737 B.C.)

Right *Dendrobium nobile*,
a medicinal orchid of the
physician Li Shi Chen
(1552)



Left Emperor Shen-
Nung (Colln. Johns Hop-
kins Library)

Center II *Cynosorchis* of
Dioscorides and III *Palma*
Christae (18th century
engravings)

Right *Orchis morio*,
"cuckoo flower"

Left *Orphys arachnites*,
one of the "insect or-
chids" of Jerome Bock
(Serapias orchid)



Right *Orchis laurentiana*
(?) one of the *Palma*
Christae orchids



Left *Orchis maculata*,
"Dead men's fingers"



Right *Cypripedium cal-
ceolus*, one of the lady's
slipper orchids



passions, Orchis attended a festival of Bacchus and becoming drunk on the wine he seduced a priestess. In rage the people tore his body to pieces and scattered it. The satyr father of Orchis implored the gods to restore his son to life, but they replied that he had been so intemperate in life that his death was a satisfaction to all; however, the plea mollified their decision and allowed him to spring from the scattered pieces as a flower that should bear his name. Even this was considered a possible error, for since that time it was said that those who ate of the root would be converted to the satyr state of hedonistic pleasures of the flesh.

Jerome Bock (who assumed the Latin name of Hieronymus Tragus), acting in accord with the doctrine of signatures, which states that each plant betrays its origins and use in the form of its parts, believed that since the flowers of orchids like *Orphys* sometimes resembled bees and like insects these plants were borne of such insects; also, for reason of the nest-like mass of roots of other orchid species, they must arise where birds nest and mate. Athanasius Kircher (1601-1680) spoke of orchids in his *Mundus Subterraneus* under the name *satyria*, thus recreating the old mythology. He states that where animals are brought together for the purpose of breeding, in that ground orchid plants will be stimulated to grow.

It was Dioscorides, writing in the first century A.D., who was responsible for promulgating the mythical use of orchids as aphrodisiacs and love potions to be repeated later by Pliny. *Cynosorchis* was the plant name used by Dioscorides when he wrote of boiling the larger roots and eating them to beget male children and eating of the smaller root to beget females. He also states that the women of Thessaly put the softened root into goat's milk to stimulate lust, and the dry root to restrain it. The virtue of one was said to have the ability to extinguish the other. Parkinson wrote in his herbal of 1640 that he has doubts of the specifics, but that he believes that the firm root is effectual in procuring lust.

The plant of the gallows is generally taken to be mandrake (*Mandragora officinarum*), but to some it was the orchid, for the gallows plant was said

to arise from the seminal effluvia of a hanged man. This legend has its antecedents in the Greek myth of Prometheus who was bound to Mt. Caucasus where a bird devoured his liver daily. In the process *ichor* spilled to the ground and from this emerged an herb which shrieked and groaned like Prometheus. Going all the way back to the legend of Orchis, it did not seem unreasonable that an herb with the root fashioned like the part of the man from which it came should appear under the gallows. It was the gallows herb that Amelia is sent to gather at the command of the witch Ulrica in order to restore her lost ardor for her husband: this in Verdi's opera "A Masked Ball."

The astrological botanist Nicholas Culpeper in the seventeenth century affirmed all that had been attributed to the orchid in the way of provoking lust, by stating that the orchid was under the dominion of the planet Venus and must then be a guide in love. He also believed that a bruised orchid root applied to the proper place would cure "the King's Evil" — a degeneration of the lymphatic glands (scrofula).

Another botanist of Culpeper's generation, Johan Gerard, wrote in his herbal of 1633 that orchids, known as Dogs' stones, being drunk stirred up "fleshly lust." Those of dryer areas have a smaller root and are useful in preventing venerie.

Orchis maculata was known in old England as "Dead Men's Fingers," "Hand Orchis," and "Palma Christi" for reason of the tubers being divided into several finger-like lobes. This is the same species that Gerard refers to as "Female Satyrion." Shakespeare is referring to *O. maculata* in *Hamlet* (Act IV, Scene vii) in which Ophelia's death by drowning, having garlanded herself with flowers, is thusly described:

"There is a willow grows aslant a brook,
That shows his hoar leaves in the glassy stream;
There with fantastic garlands did she come,
Of crow-flowers, nettles, daisies, and long purples,
That liberal shepherds give a grosser name,
But our cold maids do dead men's fingers call them."

We need not speculate on the name

the rude shepherd might give to the "long purples" or "dead men's fingers"; it was surely drawn from the tradition coupled with the obvious configuration of the root.

Then in an old English ballad the fingers are metamorphosed into a thumb and the verse is in the following meters:

"Then rounde the meddowes did she walke,
Catching eache floure by ye stalke,
Such as within the meadowes grew,
As Deadmans Thumb and Harebell blew;
And as she pickt them, still cried she,
'Alas! there's none e're loved like me' "

While fairies are not directly involved in witchcraft, they are often implicated as apprentices to witches. In Shakespeare's *A Midsummer Night's Dream*, Puck is apprenticed to Titania and as an evil sprite performs various acts of mischief. The elfin changelings of Shakespeare were soulless creatures capable of acts of malice. It was for misbehavior that the witch Sycorax imprisoned Ariel in a pine tree for twelve years (*The Tempest*). The Reverend H. Friend, who was an authority on literary sources and flower lore identified the composition of the fairy-garland as stitchwort, harebell, wild thyme, and cuckoo flowers. Looking into this intriguing combination, I found the following sixteenth century associations with the plants: the stitchwort is of the genus *Alsine* and was said to be responsible for the transport of mortals to fairy realms, if plucked; the harebell of England is a wild hyacinth born of the blood of the slain Hyacinthus, beloved of Apollo and Zephyr, hence the flower of grief; wild thyme was said to harbor the souls of the dead, especially murdered people; the cuckoo-flower is identified as both *Orchis morio* and *Orchis mascula* (*maculata*). The cuckoo-flower was so called because it was said to bloom when the first cuckoo was heard in the Spring. Moreover, the fresh tuber of the cuckoo-flower was used by witches in philtres to inspire love and to promote conception. If such tubers were large it signified a male child, the smaller a female. Dried tubers were indicative of a loss of love and were used to allay sexual appetites and render a person

impotent. The curious thing about this garland which the fairies of Shakespeare's day used to subdue and transform mortals is that it is a tradition which may be traced back to the ancients. In Dionysian mythology, Silenus is able to prophesy when he is intoxicated and garlanded by mortals.

The orchid was used by witches in various decoctions to be employed in evil doing. Certain plants were traditionally associated with the Devil and consecrated to his dark work. Just as his eye is henbane, his intestines bindweed, his hand is *Orchis*. The species in question is probably *Orchis maculata*, for as an alternative to Devil's hand, it was known as "Black Mary's hand," Black Mary being the antithesis of the Virgin — the black descriptive of the dark color of the tubers as well as the color symbolic of the Devil. In Germany the orchid *Dactylorhiza incarnata* was known under the name of both *Teufelshändl* (devil's hand) and *Teufelsklane* (devil's hoof) because of the resemblance of the tuber to both of these. But in the lore of "white-magic" the lady's slipper orchid is consecrated to the Virgin Mary for reason of the delicate slipperlike labium. This protective "herb-of-grace" was formerly dedicated to Venus and probably in Nordic traditions to the great female figure, Freya. Herbs-of-grace could be worn, rubbed on the body, incorporated into amulets, or attached to a household — frequently above a mantel.

It is evident to any botanist that the practice of medicine emerged from a tradition which has its origin in witchcraft. The American lady's slipper (*Cypripedium pubescens*) was that herb which the physician John Gent watched "A wanton womans" (sic) gather under the name of dog stones. This took place in New England around 1670. He maintained that the roots of the plant mixed with wine made an 'amorous cup,' which wrought the desired effect." This tradition, derived from Europe, implicated orchids in witchcraft as a love potion. However it was soon evident to a few that the American dogs' stones, differing in both genera and species from its European relative, was somewhat efficacious in relieving nervous disorders and hysteria. As an antispasmodic, it enjoyed some considerable

attention by physicians in the early herb medicine practices in this country and was in the U.S. Pharmacopaea as "*Extractum Cypripedii Fluidum*." Sold under the name "nerve-root" it soon became known as American Valerian because of having narcotic properties similar to the European Valerian *Valeriana officinalis*. Known also under the name all-heal, *Valeriana* belongs to the family Valerianaceae and is not remotely related to the orchid known as American Valerian.

Over nine different species of orchids have been used as a medicine under the names Salep, Saloop, Sahlep, Levant Salep and Satyrion. The origin of Salep comes from the Arabian word *Sahlep* where it was used in the manner of a beverage made from the crushed tuberous roots of several orchid species. These tubers contain a starch-like photosynthate known as bassorin, which has a sweet taste and an indelicate fragrance. The English began to import *Sahlep* at an early date from Arabic countries for Charles Lamb refers to a "Salopian shop" in Fleet Street and suggests that the delicacy of flavor exceeds "the Chinese luxury" and with a slice of bread and butter it would make an ideal breakfast for a chimney-sweep. While having virtually disappeared from London as a beverage, it still appears in Istanbul as a hot drink. The English soon found that they had seven native orchids which would serve equally well in making Salep. Soon it was produced from almost every European and Eastern country having orchids. Because of the mucilaginous nature of the bassorin it became employed as a medicine for the treatment of colitis, diarrhea and as an easily digestible starchy food for convalescents. Because the dried material swells several times its size when water is added, it was a standard starchy food on all ancient sailing vessels. Bassorin still appears in standard pharmacognosy books as a demulcent, in conditions of hyperacidity, and as an emollient, although it usually is taken from members of the legume family (especially *Astragalus*).

Europeans as well as Asiatics have used the rhizomes of *Epipactis helleborine* against swelling and inflammation of the joints and now this species has

become naturalized in North America, being introduced into our own folk medicine along with *Goodyera pubescens* which had a considerable reputation for curing diseases of the lymphatic glands. *Laelia maialis* and *L. autumnalis* are both used in Mexico for fevers and coughs. From the south of Mexico through Brazil *Maxillaria bicolor* rhizomes are employed as fever cures. Chile has a native orchid, *Brachystele unilateralis*, which is used as a diuretic as is *Epidendrum bifidum* in Central and South America; the latter is also employed against internal parasites much as *Epidendrum auriculatum* is used in India. Another member of this genus, *E. pastoris*, provides a fine remedy for dysentery in Mexico and is sometimes mixed with *E. bifidum* for this purpose. Jamaicans eat the bulbs of *Bletia verecunda* to aid in digestion. In the Arabian countries *Lissochilus arabicus* is known in the market places as *dschissab* and is sold as a mucilaginous juice to be used in the treatment of open wounds; it is reported to have the properties of a local anesthetic. This is consistent with the Japanese use of *Arethusa bulbosa* as a remedy for toothache, or the narcotic properties ascribed to *Cypripedium pubescens* in North America.

It has been observed that bees visiting the flowers of *Cymbidium devonianum* become so stupefied that they fall to the ground in a benumbed state. Such narcotic properties must have had an impact on shamanism in several parts of the world, but the only known instance is the one of the Aurvedic medicine men who are known to have used *Vanda tessellata* and *Ephemerantha macraei* in some medicinal rites involving some prophesy and divination.

The curious history of the uses of orchids is really a synoptical sketch of magic into medicine or the origin of many medical traditions. Both tranquilizers and birth-control agents have histories rooted in folk traditions which were only recently uncovered. Perhaps some enterprising pharmacologist will conduct an ethnobotanic survey of some of these bizarre traditions and find equally interesting chemical attributes in these, the most beautiful of flowers.



Left *Cypripedium pubescens*, an aphrodisiac?



Right *Laelia autumnalis*, for coughs and fevers



Left *Laelia maialis*, a native Mexican remedy

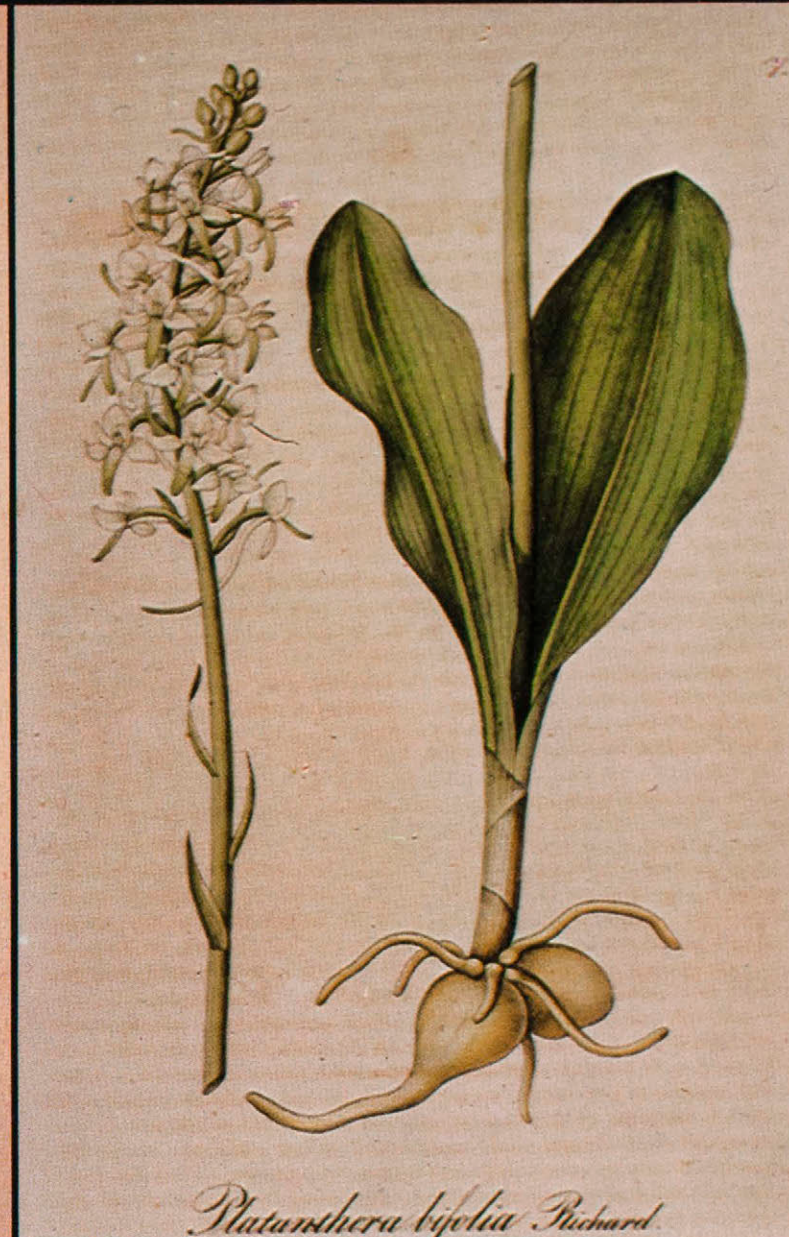


Right *Orchis coriophora*, one of many sources of "salep"

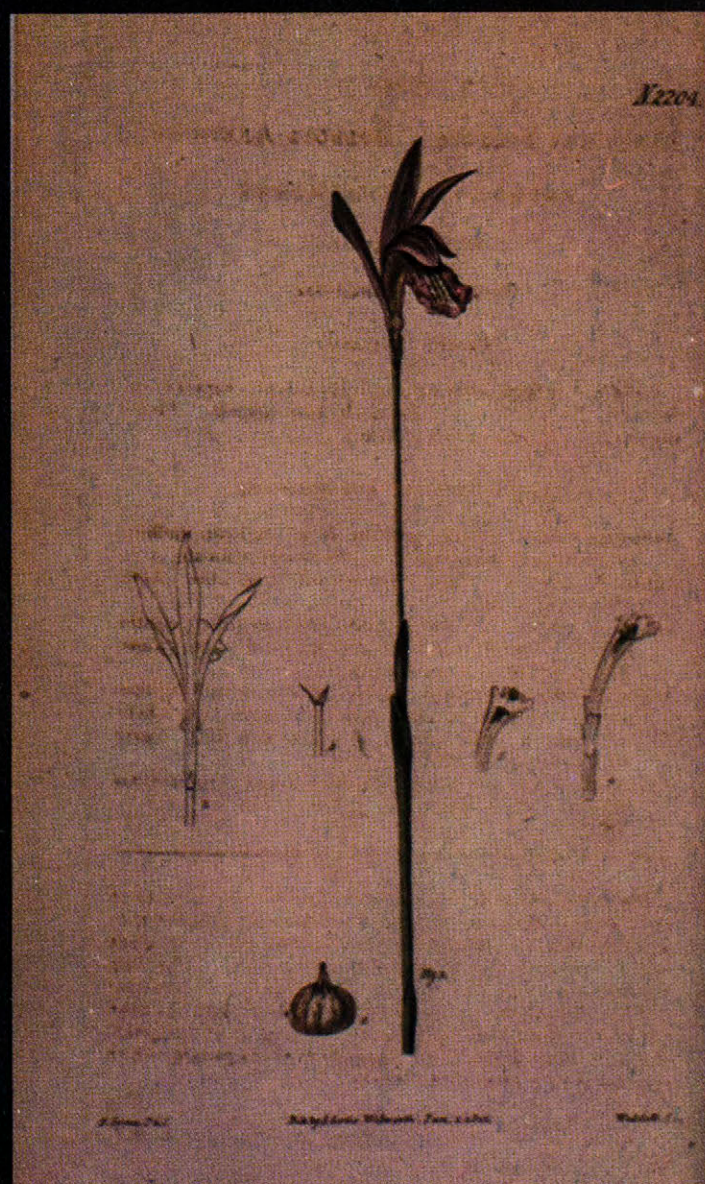
Left *Vanda tessellata* (*V. roxburghii*), an Aurvedic divinatory



Right *Platanthera bifolia*, American dog's stones



Left *Arethusa bulbosa*, a nervine for toothache



Right *Epidendrum bifidum*, used against dysentery in Central America





Tepic- Debut of a Regional Museum

by Peter T. Furst

Regional Museum in Tepic, Nayarit, a colonial palace restored to its original condition and opened to the public in 1969.

Unbeknownst to most tourists driving through Tepic along Mexico 15, just a few blocks from the turn-off to Puerto Vallarta is one of the most charming regional museums in all Mexico — the Nayarit State Museum of Anthropology and History. Opened as a full-fledged museum in its own historic building only in 1969, it is still too new to have become widely known — in any event, it is not yet mentioned in the Auto Club's tour guide for Mexico. More's the pity, since Highway 15 is the usual route of most road travellers from the western United States to Mexico and since it is in Tepic that one finally comes face to face for the first time with Indian Mexico past and present. Huichol and Cora from the rugged mountains of the Sierra Madre Occidental can almost always be seen wandering through the streets of the state capital in their indigenous garb; a few miles to the south lies the important archaeological zone of Ixtlán del Rio, and in all directions from Tepic — indeed, beneath its very streets — are the ancient shaft tomb cemeteries which have yielded so much of the fine funerary art in private and public collections throughout the world. All three — the living ceremonial art of contemporary Indians, Postclassic objects dating to the florescence of the Ixtlán ceremonial center and after, and funerary ceramics of the shaft tomb cultures that flourished between 100 B.C. and A.D. 2-300, can be seen under the best possible conditions at the new Tepic museum.

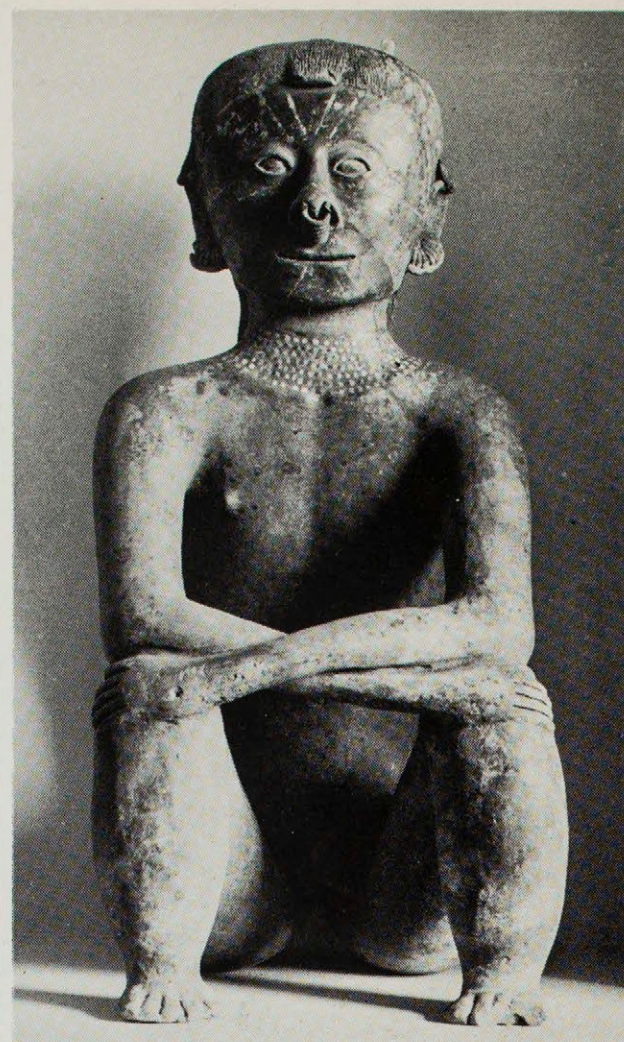
It may be recalled that it was in Tepic, some seventy-five years ago, that the great pioneer of Mexican ethnology, Carl Lumholtz, obtained the famous gold-leafed turkey effigy vessel as well as his collection of shaft tomb figurines, both now in the American Museum of Natural History in New York. Nothing like the Lumholtz turkey is in the Tepic Museum, but on the other hand, no other public institution — the great National Museum in Mexico City included — has a finer display of the extraordinary monumental "Chinesco" effigies discovered some years ago by looters in a shaft tomb cemetery near the village of Tequilita, between Tepic and the Pacific Coast. Of the largest of these funerary figurines, a seated male is now in the American Museum, a

female in the Museo Nacional de Antropología, and two other monumental males and a female in private collections. The Tepic Museum owns a large male 80 cm high (see photo) as well as a monumental female, and several somewhat smaller, but still impressive, figurines of the same style. There is little question that at least the largest of these magnificent funerary sculptures came not only from the same tomb, or series of tombs, but from the hand of the same sculptor.

Despite these and many other important treasures in the Tepic Museum, its director, Lic. Jorge Hernandez Moreno, readily agrees that his institution, which devotes itself exclusively to the archaeology and ethnology of one small state, Nayarit, cannot be compared to other larger and longer-established regional museums in the federal republic, such as that at Jalapa, Veracruz, for example, with its enormous collection of Gulf Coast art, from Olmec to the late Postclassic. And as for size — the Aztec hall of the Museo Nacional de Antropología alone could accommodate the entire Tepic Museum, with room to spare on all sides. On the other hand, while the Museo Nacional is a monument to the genius of contemporary Mexican architecture, the Tepic Museum can itself be admired as an antique *objet d'art*, for it is a particularly graceful example of early 18th or late 17th century colonial architecture, restored as much as possible to its original condition. More than that, as the photographs in these pages show, it represents the happiest of blends between a truly historic environment and the latest in exhibition techniques. This is the result of close cooperation between the federal museum authorities in Mexico City and the state government of Nayarit — especially the efforts of architect Pepe Lameiras, who supervised restoration work on the old colonial palace in which the Tepic museum is housed, and INAH museographer Manuel Oropeza, sent from the capital to design and install the archaeological and ethnographic exhibits. (INAH is the *Instituto Nacional de Antropología e Historia* which has charge of all museums and archaeological and historic monuments throughout Mexico).

Before restoration, which began in 1967, and the formal opening of the regional museum in 1969 under its present director — a Nayarit-born sociologist educated in Mexico and at Harvard University — the beautiful old structure had a checkered career. In colonial times it was reportedly the private residence of the Counts of Miravalle. In the 19th Century it became headquarters for a German commercial firm with mining and agricultural interests in Western Mexico. After the Revolution of 1910 it passed into the hands of the state government. At various times it served as Presidencia Municipal (City Hall) of Tepic, headquarters of the government party, the PRI, and primary school. In 1960 three rooms on the ground floor were set aside for a simple local museum. Other rooms in the historic building — by then in serious disrepair — were occupied by the state tourist office, the federal electoral authority and, ironically, the state administration for the rehabilitation of buildings. Restoration to its original colonial state finally commenced after the state authorities and INAH in Mexico City agreed in 1967 that the considerable prehistoric and ethnographic heritage of Nayarit warranted something better than three dusty rooms in a deteriorating colonial palace.

Today it stands as a gem of Mexican colonial architecture and a model museum of regional culture — archaeological and ethnographic. No one who travels through Tepic should miss it.

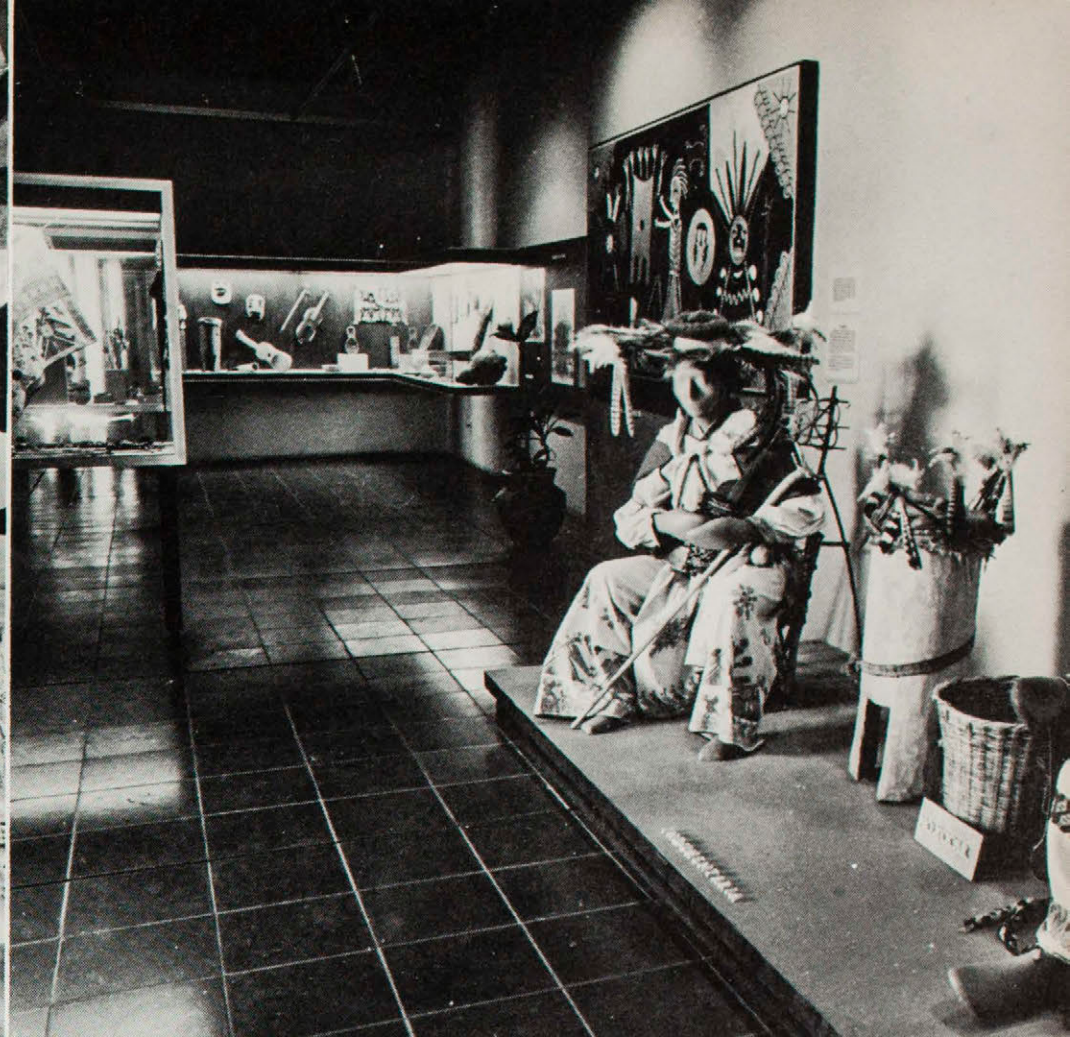


Monumental male tomb figurine from shaft tomb cemetery near Tequilita, southwestern Nayarit, on exhibit in the Tepic museum along with female in the same style. Height, 80 cm. Tomb from which these figures came has been dated by the C-14 method at ca. A.D. 100.

All photos by Peter T. Furst



Interior courtyard.



Partial view of ethnographic hall devoted to Huichol and Cora Indian ceremonial art and utensils. Large yarn painting on wall is by the Huichol artist and *mara'akáme* (shaman) Ramón Medina Silva. The Museum also maintains an Indian arts and crafts store which encourages the maintenance of high standards by native craftsmen.



Archaeological exhibition halls on ground floor.



Stairway at right leads from columned and tiled gallery around courtyard to second floor, which houses ethnographic collections, a large colonial *sala* devoted to early paintings and archaeological laboratories.

The Old Plaza Church

by John Dewar
Associate Curator
Western-American Art

Today the Plaza Church stands renovated, doors open for all the world to see. That is the *oldest* Plaza Church. For in reality there are two churches, dos-a-dos, back to back, like those two volume curiosities one used to encounter in rare book shops. One church ostensibly built big enough to house the needs of the parish opens on New High Street; the other, the original Plaza Church, opening as it always has on Main Street.

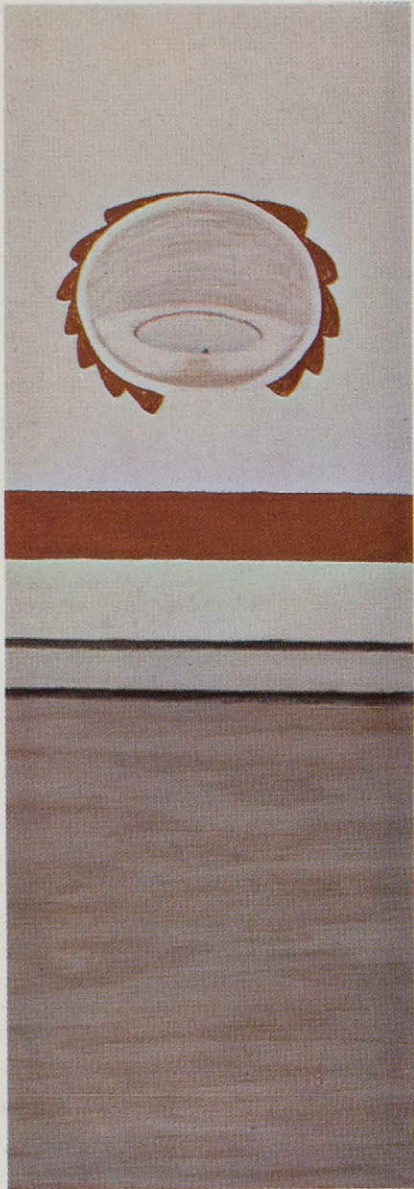
No one, it seems, pretends or suggests that what we now see is an historical reconstruction of the original church or even any of its later phases. To quote from *Westways* magazine, October, 1966, "the architects have done a creditable job of it — considering, that is, that by 1965, no one *really* knew exactly what the original church had looked like." This, of course, leaves but one aspect from which to judge the present renovation — little more than a job of interior decoration.

But is it true that no one really knows what the original church looked like? If so, it is only because no one really cared to look. When the interior walls were finally stripped down to the bare structural forms everything lay exposed to the eye of the historical archeologist. But apparently no such study was made. What is common procedure in the historical homes and buildings of the Atlantic seaboard and other countries of the world, the kind of studies one reads about in museum publications concerning Jamestown, every Western fort, and most prehistoric pueblos was, it would appear, ignored in the oldest building existing in the heart of downtown Los Angeles.

One sunny morning — two years ago, now — an errand took me down to the old section of Los Angeles. As I crossed Main Street and walked past the old Plaza Church, begun in 1819 and now 150 years old, it seemed to me that what was left of the venerable building hardly merited attention. I had looked in on it since I first heard that it was to be destroyed — demolished to make a parking lot — and subsequently during its various stages of salvage and renovation. As finally reduced to adobe walls its interest seemed purely structural. The roof was removed along with the board floor. Square floor tiles were

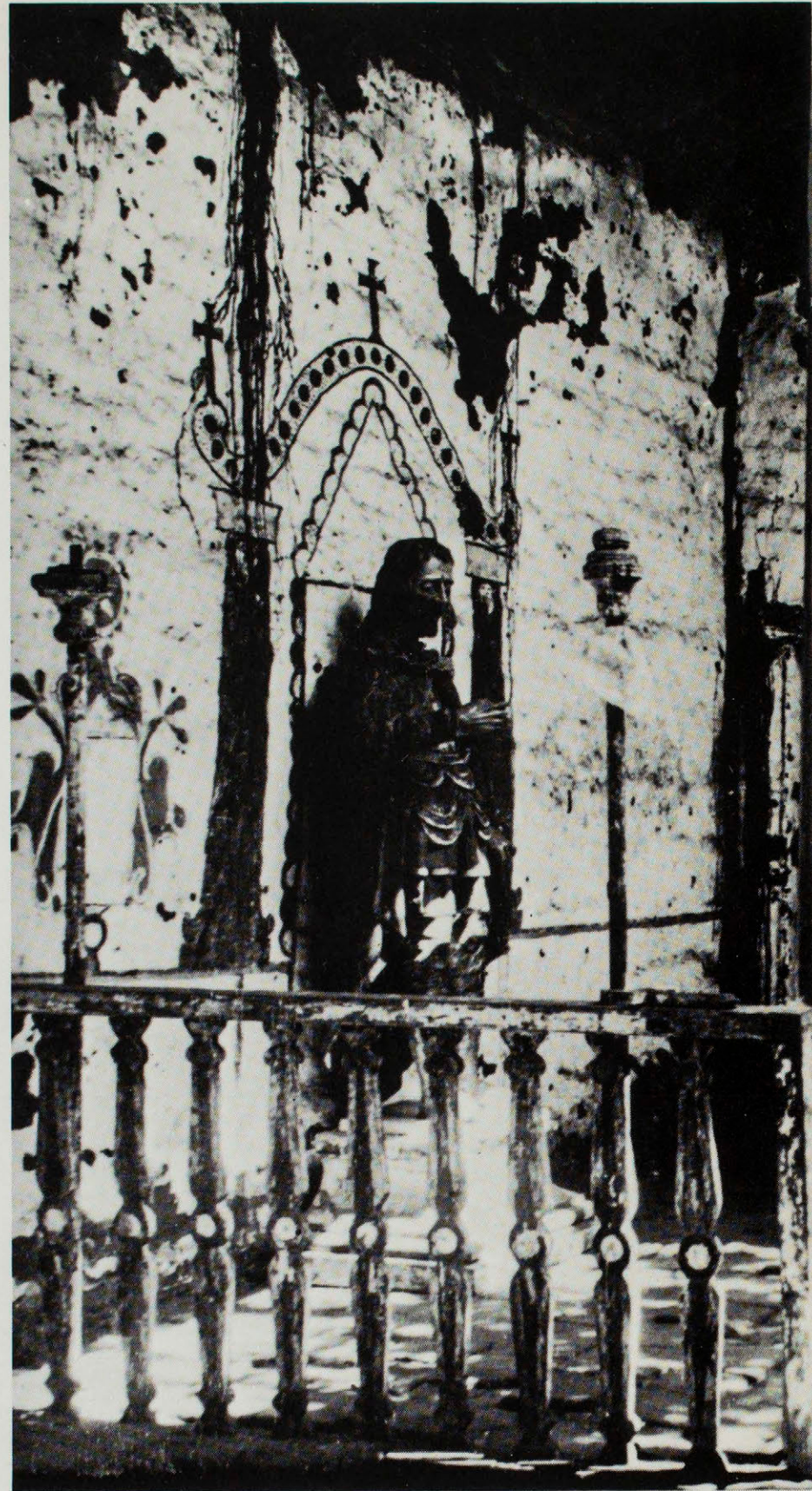


Old Chapel, San Juan Capistrano Mission, 1900. View of the rear of the church with the choir loft. When Los Angeles finally had its church in 1822 it probably looked very similar to this. The austere beauty of this simple edifice would have been sufficient for the needs of the parish at that time.



Color and Design Progression.

With a piece of string retrieved from the floor and a scrap of paper the Author was able to measure off the dado and related stripes and annotate them with fragments of color and plaster from the wall. This restoration in a color sketch shows the church wall and the holy water font and Chinese bowl insert as it originally looked.



The Altar, San Antonio De Pala.

This chapel of the *asistencia* to Mission San Luis Rey retained the original Indian decoration until quite recently. The Indians who worked on the Plaza Church came from the Missions San Luis Rey and San Diego.



Chinese export porcelain bowl, used as a vessel for holy water in the Plaza Church.

The bit of *brea*, or tar, can be seen on the bottom of the bowl. This font was in the left wall as you enter the front door of the church. Directly opposite in the right wall was an identical one.

piled outside, to ultimately disappear. I made a last search for some remnant of the original *brea* roof that might remain hidden in a crevice, walked over the new cement floor and decided that we seem utterly incapable of enjoying anything if it is old.

New and very white doors, the river-of-life deeply channeled in their surfaces, stood ajar to the warm eastern exposure. I looked into the large dim cubicle, dark adobe walls stripped of their various veneers. Just inside the door a workman was setting marble panels against the south wall. As the old plaster was being unmercifully hacked loose to allow the placement of the marble my attention was drawn to the old dado giving way to the utter vulgarity of inappropriate marble. About thirty-two inches high (isn't that a vara?) it retained its original mauve color, incomparably beautiful. This was edged with alternating bands of black and gray, with all the softness of old frescos from earth colors and the spontaneity a staid architectural motif can have when hand-limned by an artisan. However, in places beneath this grey sand coat of plaster was an earlier one, white and very thin, which could only be a hand-wiped coat such as I had often seen the women apply to the walls of the rooms at Oraibi. Glistening yeso. Beneath this, and a small segment separated easily from the wall, was the original thin coat of earth — mud plastered over the adobe bricks which were now exposed, 24" in length by a thin 3¾" in thickness, with wisps of binder showing. But most interesting of all, above the dado, just right of the entrance to the baptistry, was the font for holy water, an oval hollow about 12" in width scooped into the wall with a bowl imbedded to hold the water. The original white coating remained around and in the front as well as traces of typical Indian designs in earth red.

The bowl had been shattered — hacked at to allow for the new veneer. Its fragments lay in the debris of adobe and plaster at the base of the wall and I asked a workman if I could save them. Of course, it was all to be dumped and would I like the remains of the bowl in the font as it would all have to come out? I gathered the pieces, a beautiful example of fine Chinese export ware.

Strangely, on later examination a piece of tar was found stuck tight to the surface, *brea* probably, that on a hot day had somehow found its way into the bowl. And one would have to be very unimaginative not to wonder at all the fingertips which had touched this vessel as they lifted the drops to make the sign of the cross . . . Navarro, Moreno, Rosas, Pico, Rubio, Varelas, Alvarado, Cota, Avila, Figueroa, Verdugo, Coronel . . . the list could go on.

Opposite this bowl, in the north wall, was another font clearly discernible but as yet untouched. One, of course, has always been in use to the right of the door in the north wall. It was intact and did not seem to be porcelain but more than likely steatite — Indian from its feel and appearance.

Up until now there has been no real indication of how the church looked, merely that according to a letter November 5, 1821, of Prefecto Payeras, "With the coming April (1822) so many neophytes will come from Missions San Luis Rey and San Diego as may be required to conclude in September the holy temple, covered with its roof, all white-washed, and somewhat decorated." (*San Gabriel Missions and the Beginnings of Los Angeles* by Fr. Zephyrin Engelhardt, San Gabriel, 1927, p. 128). And soon all traces of these faint vestiges of decoration would disappear. No soft beauty of a tamped earth floor, freshly sprinkled and swept. No dado in soft mauve lined in black and white. No holy water in a Chinese bowl wreathed with a design from the hands of an Indian, in red earth, the original and real cinnabar or hematite. No simple altar such as would have served the small and poor parish for it should be remembered that when the church was finally finished the population of Los Angeles numbered about 650 souls or 70 families.

Hard to believe that here in one of the wealthiest of cities there could not be spared the means nor money to have restored this single significant remaining building from the past, the oldest building in downtown Los Angeles with love and fidelity to some semblance of its original form. Hard to believe that no one with influence and interest in history could not have come forth and championed such a restoration.

A. Earth-red upper border of dado — earthy iron oxide, ochrous hematite, or cinnabar. This thick fragment of plaster has adobe sticking to the back. On the surface can be seen a thin, later layer of plaster.

B. Abalone shell, of California Indian origin, containing red pigment and a "stone" of red earth, iron oxide or, more probably, the red mercuric sulphide mineral called cinnabar. From the Channel Island Survey, San Clemente Island

C. Above the dado a very thin coat of white plaster was applied directly to the wall. This is from the surface around the holy water font and shows the red paint used in the surrounding design. Reverse fragments show adobe residue.

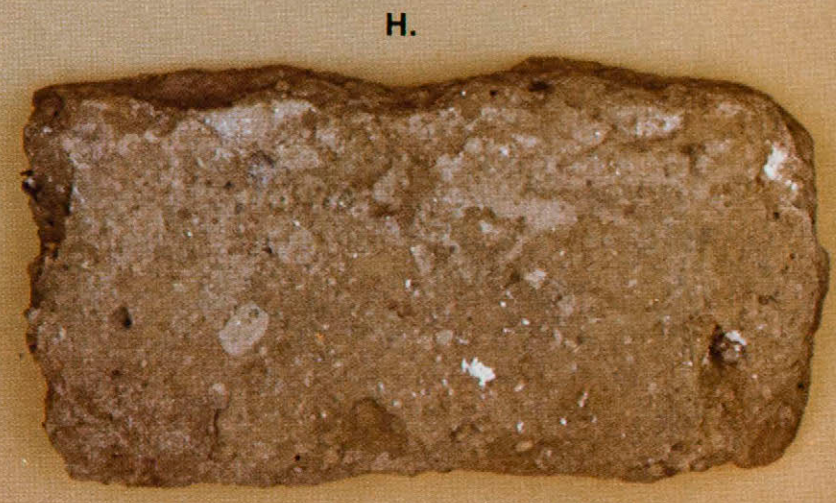
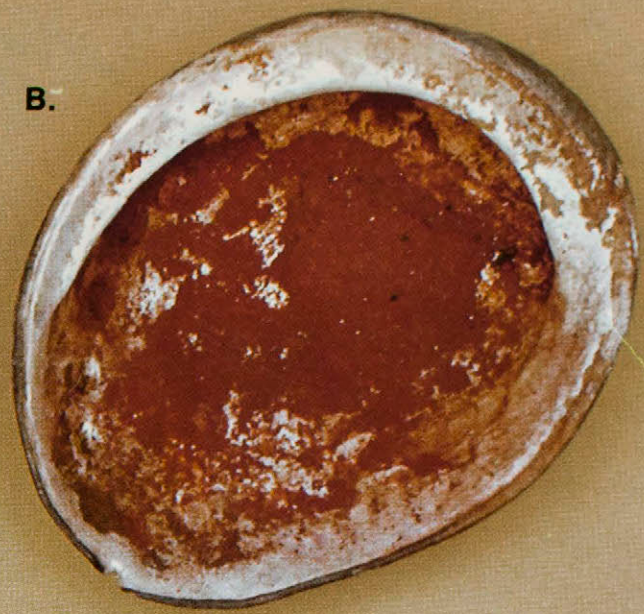
D. Original layer of plaster showing coat of white paint (upper), black line, and coat of grey (lower). The white appears grey from the accumulation of dirt on the surface. Under a magnifying glass the white is clearly a paint — not the color of the plaster. The reverse side of the same segment is shown.

E. A thin layer of white plaster which seems to have been a richer mix than that on the dado. On this is a coat of earth red paint which was later covered with white wash. If the red paint had been applied to the plaster at the appropriate time this would approximate true fresco.

F. Original coating of mud. This was applied over the adobe brick construction. The plaster was applied directly onto this layer as the residue on the upper fragment shows. The lower piece is the reverse side which contacted the adobe bricks.

G. Original layer of plaster showing red earth paint beneath the mauve coat of the dado. The black striping appears on the one specimen. Next to it is the reverse side of an identical fragment with traces of adobe adhering to it. Variations in the thickness of the plaster can be clearly seen.

H. Section of adobe brick showing thickness of 3-¾". This one — a typical specimen — measures 23-¾" in length.





By 1928 Marconi, who as a youth was unable to meet the entrance requirements for the Italian Naval Academy, cruised the world aboard own yacht, the aptly named "Elettra".



Marconi: Inventor and **Entrepreneur**

by Dixie P. Myers

One summer night, in the year 1894, an excited young man awakened his mother and led her up three flights of stairs to the top floor of their villa; a room gleaming with jars and cluttered with electrical apparatus.

"As she watched, he bowed his blond head over a telegraph key set on a work bench under a window and tapped it delicately with one finger.

From the far end of the long double room came a gentle, insistent sound. A bell was ringing, little louder than the crickets but with concise, wakeful clarity. Between the transmitter under his hand and the tiny tinkling bell lay nothing but air." (The quote is by Degna Marconi, in *My Father Marconi*.)

It was a dramatic moment, and that moment affects every American who has ever turned on a radio or television set.

Wireless telegraphy; radio—created major international problems, for it was international in scope and implications from the very beginning. Radio waves are no more cognizant of national boundaries than sunshine. So, how were radio waves to be used? If information could be transmitted, who was

going to pay whom for the privilege? And — crucial question! — what body could enforce payment? All of these were questions whose answers were just as important to young Marconi as any of the technical problems he surmounted on the way to his invention. Therein lay his particular genius.

For Marconi built something far more consequential in that empty air between his transmitter and the "tinkling bell" than any inventor of his time. It was a commercial empire to be sure, but a commercial empire with international political and economic ramifications. Historian Sydney Head wrote, "Of all the pioneer inventors engaged in the struggle for self-sufficiency, Marconi alone succeeded." Somehow "succeeded" seems too pale and wan a word to describe it.

Marconi, an Italian, took out a series of British patents, on the basis of which was developed a British company and, later, an American subsidiary. These companies and the subsequent relations between their respective countries in the years leading up to World War I were to have profound effects on the future of American broadcasting.

Perhaps that is why some analysts have classified Marconi's contributions to the commercialization of wireless as more important than his inventions. Certainly he was not the first to envision a means of wireless communication. For half a century before, experiments had been made in the transmission of information by electricity without wires. There was good reason for interest in this technique. Wireless communication meant using media that were known to conduct electricity, such as air and water, saving the cost and inflexibility of a permanent wire network. Samuel F. B. Morse, who is generally credited with the invention of the telegraph, devised a system whereby an electrical signal was sent across a canal using submerged metal plates, but too much current was lost by diffusion. The ubiquitous Thomas A. Edison actually patented a wireless system . . . "in which electrostatic charges in one tower induced a similar charge in another or in a ship at sea." This brings up a most immediate and obvious reason for interest in wireless telegraphy. Once ships at sea had dropped from sight they had no way to communicate with

land other than homing pigeons; and even homing pigeons were of no use when one ship needed to communicate with another, and that ship was out of the line of sight.

More relevant still was the basic research going on at the time. In 1873, the year before Marconi was born, James Clerk Maxwell, who has been called the greatest theoretical physicist of the nineteenth century, published *A Treatise On Electricity And Magnetism*. Maxwell stated that his calculations and experiments led him to the conclusion that "... electrical impulses travel through space in the form of waves that speed with the velocity of light."

Heinrich Hertz later confirmed Maxwell's theory with an experiment in which he essentially invented radio, generating, transmitting and detecting radio energy by means of a series of precisely polished mirrors. In 1888, he published a paper entitled "Electro-Magnetic Waves and Their Reflection." When he was asked if the waves could be used for conveying information, he scoffed:

"The vibrations of a telegraph are far too slow; take for example, a thousand in a second, which is a high figure, the wave length of the mirror must be of the same magnitude. If you could construct a mirror as large as a continent, you might succeed with such experiments, but it is impracticable to do anything with ordinary mirrors, as there would not be the least effect observable."

Maxwell and Hertz are two of the giants in whose basic researches were the seeds of all that was to come. *Neither took out patents.*

Looking at Marconi's early life, it is tempting to think of him as a lucky and persistent dilettante who later became unaccountably grasping. But a closer perusal is more revealing. His father, Giuseppe Marconi, was an Italian land owner who had made a success of both agriculture and the raising of silkworms. His mother, Annie Jameson Marconi, was the daughter of an extensive family in England and Ireland who had made fortunes with distilleries for the manufacture of Irish whiskey.

If the two families had later achieved the position of landed gentry, it was

because they had earlier accepted — even emphasized — the practical aspects of life. And for Marconi's father there seemed no practical purpose in the boy's ... "intense, almost fanatical concentration" on electricity in the upstairs room, with its incomprehensible variety of costly apparatus.

The elder Marconi was dismayed that his son was not scholar enough to apply for entrance to the Italian Naval Academy. The boy wasn't even able to go to the University of Bologna as other than an auditor of Righi's class in physics. According to his father, Guglielmo had wasted his youth with a single minded devotion to the study of electricity that amounted to monomania. Ultimately, Marconi had to prove to his father that it had *not* been a waste. Perhaps he never stopped proving it.

Marconi has left a record of what was used in his first successful experiments:

"I reproduced with rather rudimentary means an oscillator similar to that used by Righi; I likewise reproduced a resonator using as a detector of the electrical waves a tube of glass with pulverized metal based on much that was already published by Hughs, Calzecchi-Onesti, Branly and Lodge. By means of slabs of curved zinc, I formed two reflectors which I placed one in front of the other at the maximum height permitted by my laboratory. At the center of the far room I put the detector of the electric waves and bound this to a battery."

The tools were there. They only waited for someone to improve and devise a practical use for them.

Although nothing had yet been done with Hertzian waves except to lecture on them and make observations during thunderstorms, Marconi was "... harassed and driven by his acute awareness of how little time he might have from the day he started to experiment ... until he could get his first patent," according to Degna Marconi.

There were several obstacles to the practical application of the device Marconi had shown his mother that summer night. The coherer (the detector, or receiving device) was crude and slow. By using a combination of nickel and silver filings, evacuating the tube, and adding a silver plug to either end,

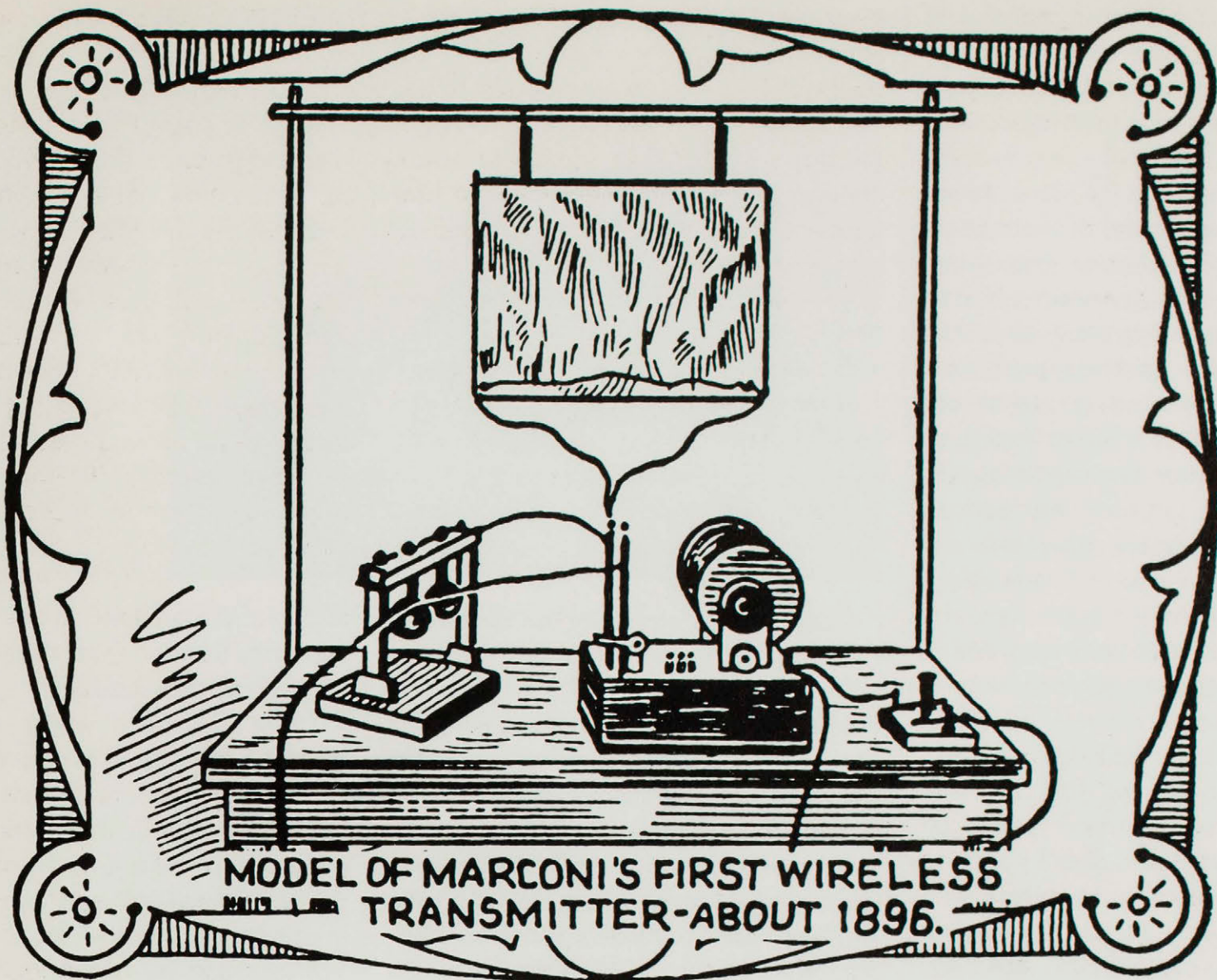
Marconi produced a much more serviceable device. The second obstacle required some luck.

Marconi knew that a system of wireless telegraphy would never be practical unless he could attain distance, and that meant that the waves had to surmount the natural interference of hills and mountains. At that time most scientists believed that Hertzian waves proceeded in straight lines if they were short (high frequency), but they were able to bend around natural barriers if the waves were sufficiently long (low frequency). Marconi, therefore, tried to increase the size of his transmitted waves, and ran into difficulty. The greater the wave length, the less power could be radiated from the transmitter, so that transmitting a wave length sufficiently long required an impossible amount of power. By chance, he discovered that he could increase the distance between the transmitter and receiver by connecting half of the transmitter with the earth and elevating the other half into the air.

With these two improvements, Marconi was at last able to convince his father that he had something practical. In 1896, he was able to send signals in Morse code down a valley and two miles beyond the hills surrounding his parent's villa.

When the Italian Ministry of Post and Telegraph refused to underwrite his work, Annie Jameson Marconi suggested that, as a maritime nation, Britain might show more interest in the invention. More important, she had friends and relatives there who could help. Armed at last with his father's support and shrewd advice, Marconi and his mother set off for London.

On their arrival, a cousin introduced him to the best patent lawyer in the city and at once Marconi set to work preparing the patent papers. "The spectre of being nosed out by another haunted him," but not so much that he was in a careless rush to write out the applications. "I had to protect my invention against every counterfeit and against a variation of secondary importance" he said. On July 2, 1897, the patent was granted; "Then, having established my priority in this new system of communication, my next thought was how to launch my invention." At the age of



From Harry Wells
collection of
Radio memorabilia



Marconi was only twenty
three when he filed for his
first patent on wireless.

twenty three, Marconi had learned to put first things — first.

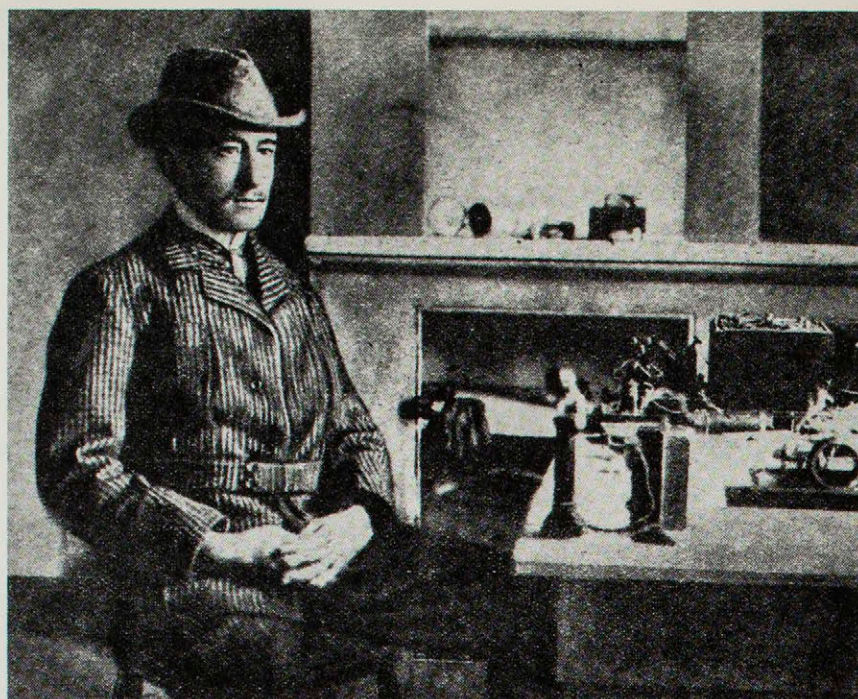
With the help of William Preece, engineer-in-chief of the British Post Office, Marconi was able to experiment more ambitiously; and, to his satisfaction, it was discovered that the system worked better over water than land. This was to have an important bearing on future developments because at that time the telephone and telegraph were common conveniences on land, but ocean going vessels still had to rely on the chancy services of homing pigeons.

Mindful of the fortunes that had already been made in the telephone and telegraph, Marconi's hard-headed English relatives and their friends were the first to invest in a company to promote wireless. Even though Marconi was to be chief engineer of the new company and receive royalty rights, he lived with the utmost frugality so that he, too, could buy shares. Marconi looked on money as a reward and didn't intend to share the fate of early inventors who hadn't any. On July 20, 1897, the Wireless Telegraph and Signal Company was incorporated with a capital of 100,000 British pounds to be used to acquire Marconi patents in other countries.

Great Britain and its dependencies had, since 1885, been party to an international patent agreement with the United States. In 1899 American Marconi was incorporated in the United States.

Both the British and American Marconi companies, as they were to be known, had an enormous advantage at the outset. They had capital and they hired only the best scientific, business and legal minds. British Marconi was able to establish an impregnable patent structure for this reason. For example, they were able to acquire the Oliver Lodge patent for selective tuning of simultaneously emitted signals, after years of litigation had tied Lodge down. This left Marconi free to expand. Marconi also had the services of Ambrose Fleming who invented an electric "valve" which materially increased the effectiveness of the receiver.

Rupert W. Maclaurin, author of *Invention and Innovation in the Radio Industry* summed up the patent situation when he wrote:



Marconi waiting for the three clicks in his Newfoundland shack

"(Marconi's) company succeeded in getting possession of many of the principal patents in the radio art, despite the fact that the most important wireless discoveries and inventions were not made by him or his associates.

Yet the Marconi company acquired, in wireless patents, a dominant position which far exceeded any of its rivals. Although Marconi's own technical contributions were not revolutionary, he applied for patents on everything he did; and was the first worker in the field whose interest was in *practical* wireless telegraphy."

Marconi's companies first concentrated on the establishment of a maritime service. It made sense; there was no competition from telephone or telegraph at sea. Ship borne stations and coastal land stations were set up; and almost immediately dramatic stories were reported. Wireless saved lives and property. And, most dramatic of all, it was instrumental in the capture of one of the decade's most notorious criminals.

Dr. H. H. Crippen, a London surgeon, dismembered his wife with professional dispatch and buried her remains in the cellar. Her relatives, suspected foul play and alerted the police. As they closed in, he fled to Canada aboard the liner *Montrose* in the company of his typist-mistress who was disguised as his son.

Early in the voyage, the captain glanced out a porthole and happened to see "father" give "son" a surreptitious and loving squeeze. The caress seemed a bit fervid. In fact, the boy looked like a girl and the father looked like . . . Dr. H. H. Crippen!

The captain went to the wireless and used it to inform London that suspected murderers were aboard.

Chief Inspector Dew of Scotland Yard immediately sailed for Canada on a ship that was due to arrive well ahead of the leisurely *Montrose*. Just off Quebec, the detective came aboard the *Montrose* from a pilot ship. He simply walked up to Dr. Crippen and, buttressing the tradition of British unflapability, he said, "Good morning, Dr. Crippen. I am Chief Inspector Dew of Scotland Yard."

The United States Navy was also keenly interested in wireless. In April, 1901, according to Secretary of the Navy, John D. Long, the Chief of the Bureau of Equipment appointed a board to consider the advisability of discontinuing the homing pigeons service and substituting for it some system of wireless. The military advantages were obvious; and the Marconi companies seemed to be in the enviable position of calling the tune. Cleverly, perhaps altogether too cleverly, Marconi refused to *sell* apparatus to the U.S. Navy. Although the Marconi companies had begun by selling equipment outright, by the time American Marconi began discussion of terms for a wireless system with the Navy, a new policy had evolved. Marconi companies, like telephone companies, would not sell equipment, rather they would sell *communication*. For a flat yearly sum and a per use charge, Marconi would supply both equipment and operator. The equipment would remain Marconi property, and the man a Marconi employee.

For a time the system worked. Shore

stations were established, manned and maintained by American Marconi; but under stress of competition with rival companies, they refused to communicate with any but Marconi equipped ships! Non-Marconi operators and equipment were ignored.

For the U.S. Navy, Marconi unbent enough to propose allowing Navy personnel to operate the equipment providing they agreed not to communicate with non-Marconi shore stations except in emergencies.

The U.S. Navy Department was not appreciative. The Navy bought Slaby-Arco equipment and also kept some American companies viable, for example, the de Forest company, United Wireless. Mindful of the strategic military importance of sea-going communications and with a long memory of their first encounter with the foreign controlled American Marconi company, the U.S. Navy "... ultimately played a decisive role in freezing out the American branch of the Marconi company.

Even at this early date the Marconi company was not without rivals. With the encouragement and patronage of the government, the de Forest company offered brisk and sometimes acrimonious competition. Competition good enough to prompt the American Marconi Company to instigate patent litigation. The following excerpt from de Forest's autobiography indicates this, but, more important, it throws into relief the basic issues for inventors and innovators in radio. De Forest wrote that as early as 1902, there was: "an endless series of patent litigations waged against me and my company, and by us in turn against infringers of my patents, litigation which until recent years has harassed and held back the development of the art throughout its long history, which resulted chiefly in the enrichment of a host of able patent attorneys, and which eventually might end in an absolute and unconscionable monopoly enjoyed — not by the original inventors and pioneers — but by those mercenary interests who amassed and could command the most gigantic aggregation of capital."

In 1913, United Wireless folded following loss of an important patent infringement suit to American Marconi. With almost unseemly haste American

Marconi gobbled up all of the United Wireless assets, 400 ship stations and 17 land stations, and a virtual monopoly on commercial wireless in America.

Ultimately, it was a costly victory. When the United States entered World War One, the U.S. Navy "... took over all wireless stations, thereby suspending for the time being the Marconi domination of American wireless communications." American Marconi never regained it.

President Wilson was said to have reached the conclusion that communication was going to be one of the dominant factors in international relations. He reasoned that the United States, due to the Navy takeover, now had the opportunity to challenge British pre-eminence in the field of wireless; therefore, before the Navy was forced to give over its wartime powers "... an American company was needed — imperatively, immediately."

This was the impetus that was needed to break through the jungle of patent litigation that was choking the development of radio. Major feuding corporations; G.E., Westinghouse, and A.T.&T., were forced by enlightened self-interest to exchange patent rights and enter into cross licensing agreements. This broke the "... dead-lock of conflicting patent rights that had virtually paralyzed the industry." American Marconi provided the nucleus for the formation of the Radio Corporation of America.

Broadcasting, as we know it, was still in the future; but the pattern of huge corporations, infinitely complex patent structures, and the concept of private ownership of what was to be known as radio had been set.

Radio Corporation of America ultimately spawned not one but two sprawling networks, NBC and ABC.

And what if American Marconi had not miscalculated with the United States Government and a war had not provided an opportunity for the United States to get out from under? Would we now tune in the American Marconi Company, AMC, instead of NBC or ABC?

Probably not. But the development of radio; of broadcasting, might have been slower. You see, as a researcher, Marconi was not interested in the reproduction of speech or music. His obsession was distance. He wanted to hurl

the signal farther and farther, across an ocean instead of an attic room. As for what he hurled, why dot-and-dash Morse code was good enough. For Marconi, it was always wireless telegraphy.

He thought of it solely as point-to-point communication, "A" paying Marconi for the means to converse with "B", like today's telephone service. Throwing a one-way message into the air; broadcasting information for everyone with a receiver to hear was one novel idea that failed to catch his interest.

Perhaps he couldn't imagine a profit in it.

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